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APPLICATION REALISTIC MATHEMATICS EDUCATION (RME) TO INCREASED THE MATHEMATICS LEARNING OUTCOMES OF ELEMENTARY SCHOOL SD NEGERI SALATIGA 12

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Abstract. This research was conducted to improve the learning result from SD Negeri Salatiga 12 on the 2nd grade's mathematics by applying Realistic Mathematic Education (RME) approach. The research was based on the Pre-test results by 73.7% of the students that do not fulfill the Minimum Criteria of Mastery Learning (KKM) which is 70. The completeness of students' learning outcomes at pre-test stage reaches a percentage of 26.3%. This research is an Action Class Research (PTK) using pre-test and post-test. The subjects of this research are 38 of 2nd grade elementary students of SD Negeri Salatiga 12. The data obtained were analyzed using descriptive statistics and hypothesis which are tested by T-test (comparisons). The results showed that there is a significant differences between the pre-test and post-test which are taught with a Realistic Mathematics Education (RME) approach, which is the Sig (2-tailed) = 0.000 < 0.05 then Ho denied. From this results of research, shows the increased learning can be seen from the results of the Post-test that reach the presentage of mastery learning 84.2%. This can be stated that the Realistic Mathematics Education (RME) approach are able to improve the achievement of learning math of 2nd grade elementary students in SD Negeri Salatiga 12.

Keyword: *Realistic Mathematics Education (RME), learning outcomes*

A. Introduction

Mathematics is an exact science. It is one of the basic science that play the important role in the daily life (Yuhasriati, 2012). The subject of Mathematics was given to the students to equip them the ability to think logically, analytically, systematically, critically and creatively, and the ability to cooperate (Ibrahim, 2012). The implantation concepts of mathematics are the first step of understanding the concrete concepts to abstracts. So the implantation of mathematical concepts are very important to lead the understanding math concepts for students.

However, math is often considered as a difficult lessons because mathematics are abstracts. So, there are many students who have difficulties to understand the mathematical concepts.

This all is supported by the pre-test result at Elementary School SD Negeri Salatiga 12 on February 25th, 2018, related with the learning outcomes of 2nd grade students on the mathematics subject which measures the understanding multiplication concepts, obtained that 28 of 38 students have not reached the determined Minimum Criteria of Mastery Learning (KKM) is 70.

Based on interviews with 2nd grade teachers, obtained that multiplication concepts are presented by images on the monitor screen. It makes the difficulties of students to understand the multiplication concepts. To overcome this problem, there needs some improvement and innovation in the teaching-learning process.

One of the innovations of learning math process is the teacher need to be facilitator, designer, and organizer, so students get the opportunity to understand mathematical concepts through student-centered learning activities. They will learn better and more meaningful if students learn directly or have experience of what they have learned. (Udin, 2008).

On the learning process, there need some approach. To achieve this goals, then it requires the real mathematics learning that can help the learning process, so students can have experienced of what they have learned. The suitable approach to improve the

understanding multiplication concepts is a Realistic Mathematics Education (RME).

As the literal meaning, Realistic Mathematics Education (RME) was developed on the basis of Freudenthal idea that mathematics is a manifestation of human activities (Wijaya, 2012). Moreover, it also referred as the Guided Reinvention process. Then the approach of Realistic Mathematics Education (RME) becomes an alternative in this research solving. The reason for this selection is based on the abstract substance of mathematics subjects, because the research of mathematics learning begins from the concrete to abstract. This illustration supports RME as a learning approach that starts from concrete things. With Realistic Mathematics Learning (RME) approach can foster the enthusiasm, passion, and confidence of students in the learning process (I Gusti Ayu, 2013). In the application of Realistic Mathematics Education (RME) approach, the teacher roles as a guide not the informer, so that the teacher's dominance can be reduce in the learning process (Wirama, 2014). In every learning activities, teacher guides and assists students in completing the given task, so the task from teacher can be completed properly and correctly (Subryanto, 2014). There's a differences between Realistic Mathematics Education (RME) approach with a conventional learning approach, this all supported by invention (Wirama, 2014). It shows that there were significant differences in mathematics learning achievement between students who followed the realistic mathematics approach with another who followed a conventional learning approach.

Wijaya (2012) explained the mathematical process to solve realistic problems in implementing RME, that is to identify mathematical concepts that are appropriate to the problems, then organizing those problems in according to mathematical concepts, gradually renounce the real world situation through the process of formulating assumptions, generalizations, and formalization. This process intend to interpret the real world problems into appropriate mathematical problems. Next, solving mathematical problems (in mathematics area). Then interpret

mathematical solutions into the real solutions, including identifying limitations of problem solving.

Based on the opinion above, it can be seen that the application of RME begins with the problems given in real terms by the teachers. Then followed by the solving problems process and reinterpreted into the real solution. The results of the process are presented through class discussions and conclude with the conclusion of problem solving with students assisted by the teacher (Ibrahim, 2012).

Advantages of Indonesia Realistic Mathematics Education approach (Ariyanti, 2009) privilege of RME approach make the atmosphere of learning process enjoyable, because in the application of Realistic Mathematics Education approach uses real condition that exist around students. Students can construct their own knowledge, therefore students do not easily forget the materials that they acquired through RME approach. Through Realistic Mathematics Education (RME) approach train students to get used to think and have courage to express opinions.

Mathematics learning with RME approach are requires the right media such as the right props or concrete objects that can be manipulated by students to understand the concepts (Robiyanto, 2016). Basically, learning media are used to inform the materials, so that students developed a learning process in order to achieve their goals (Mawardi, 2018). The uses of media in the learning process is a necessity (Umar, 2013). In this research, it used "Sate Bilangan" as the media. "Sate Bilangan" is a concrete, real media and can be directly observed by students. The ingredients of this media are skewers, wax, and cork.

The successes or failure of RME approach are depends on teacher's ability to create the new style for students, whether they will try to think and communicate the progress of the new style. It can be proven by the students learning outcomes after the learning process using RME approach. Learning outcomes are students' abilities obtained through learning activities (Hardini, 2017). Learning outcomes of students include the domains of cognitive, affective, and psychomotor (Hardini, 2017). So can

be concluded that learning outcomes are changes of students' behaviour that obtained after the learning process that include domains of cognitive, affective, and psychomotor.

B. Research Metodology

This research uses Action Class Research method. According to Iskandar (2012) Action Class Research is a part of action research which is conducted by teachers and lectures in the class (schools and colleges) to improve the quality and quantity of learning process in the classroom. This research was located at SD Negeri Salatiga 12 Sidorejo district, Salatiga city, on 2nd grade elementary students.

This research uses the instruments of learning and data collection. The learning instruments are consist of Lesson plan (known as RPP) and Student Worksheet (LKS). The data collection instrument are consist of interview guidelines and test instrument. The interview guidelines are used to find out the constraints of students and the teacher's style of implementing learning process, whilst the test instrument are used to measure the student successes. The test instrument are consist of a Pre-test before learning with RME approach and Post-test after learning with RME approach.

The successes indicator of this research is students can achieve the Minimum Criteria of Mastery Learning (KKM) that has been determined which is 70. So that the score of student must reached ≥ 70.

C. Research Results and Discussions

Based on interviews with 2nd grade elementary teachers on February 19, 2018, obtained that presenting subject about multiplication concepts, teachers uses the lecture method and picture that displayed on the monitor screen. So, before taking actions, students was given Pre-test to acknowledge student's capability before start teaching using RME approach.

The purposes of this research was to know the improvement of

mathematics learning outcomes of students. Therefore, researcher will compare the results of Pre-test and Post-test from students. From the Pre-test results obtained that the highest score was 80, the lowest score was 10, with the average score 48,7.

While students learning results are not passed yet because students do not understood the multiplication concepts. Because presenting subject of multiplication concepts by images on the monitor screen. This makes difficulties on students to understand the multiplication concepts. To overcome this problem, there needs some improvement and innovation in teaching and learning process.

The action that taken by researcher are to perform the learning process using Realistic Mathematics Education (RME) approach with "Sate Bilangan" as media. Researcher expect that through the Realistic Mathematics Education (RME) approach, students will learn concretely, real, and could directly observe the media that used by researcher, so students can understand multiplication concepts and able to solve the problem from the teachers and can encounter problems in the surroundings.

The results of mathematics learning after using RME approach obtained that the highest score was 100, the lowest score was 39, with the average score 71,8.

Here the comparison table of Pre-test and Post-test students result of mathematics learning.

Table 1.The Comparison of Pre-test and Post-test Result of Students

Mathematics Result	Pre-test	Post-test
Highest Score	80	100
Lowest Score	10	30
Average Score	48,7	71,8

Action Class Research (PTK) result on 2nd grade students of SD Negeri Salatiga in multiplication concepts using RME approach can increase the students learning outcomes. These results can be seen by the table of students' completeness learning results with Minimum Criteria

of Mastery Learning (KKM), 70. There is the Completeness of students learning outcomes on table 2 down below.

Table 2. The Completeness of Pre-test and Post-test Learning Results

Completeness	Pre-test		Post-test	
	Total	%	Total	%
Passed	10	26,3	32	84,2
Unpassed	28	73,3	6	15,8
Total	38	100	38	100

The table above shows increasing of passed percentage from Pre-test 26,3%, then increased on Post-test 84,2%. According to the Research Action Class Research (PTK) result with RME approach on Pre-test, only 10 students passed the Minimum Criteria of Mastery Learning (KKM) 70, with a percentage of 26,3%. And students who have not passed Pre-test are 28 students with percentage of 73,7%.

Then there was an increased learning results on Post-test, there were 32 students with percentage of 84,2% passed the Minimum Criteria of Mastery Learning (KKM), and there are 6 students that have not passed the Minimum Criteria of Mastery Learning (KKM).

So, the result of this research prove that the application of Realistic Mathematics Education (RME) approach to multiplication concepts proved to improve the students' learning outcomes of 2nd grade students in SD Negeri Salatiga 12. These data are also supported by the results of T-test (comparison) which was shown in table 3 and 4.

Table 3. The Analysis of One-Sample Statistics Comparative (T-Test)

	N	Mean	Std. Deviation	Std. Error Mean
Learning Results	76	60.26	21.477	2.464

The One-Sample Statistic Table describes the statistical value of the quality of teaching such as: Total Sample (n) = 76, the Average Quality of Teaching 60,26, Standard Deviation 21, 477 and Standard Error Mean = 2, 464.

Table 4. The Analysis Data of One-Sample Test Comparative (T-test)

	T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Learning Results	24.462	75	.000	60.263	55.36	65.17

The output are known as sig (2-tailed) = 0,000 <0.05 then Ho is denied. Then there are some significant differences between Pre-test and Post-test.

The results of this research are correspondence with the research by Mashudi (Mashudi, 2010) it shows that the results of this research with Realistic Mathematics Education (RME) approach can increased the students' learning outcomes. Likewise with the research by Pebriana (Pebriana, 2017) shows that learning using Realistic Mathematics Education (RME) approach can increased students' mathematics learning outcomes. This all shows that there are some significant differences between Pre-test and post-test. In Pre-test stage, the teachers have not used RME approach, they used a lecture method (conventional) which is focused on the images in the screen monitor. While on Post-test stage, the teachers uses Realistic Mathematics Education (RME) approach in the learning process. On conventional learning in class, students just sit still and listening, with teacher-centered learning, this causes students become sleepy, bored and tend to not paying attention. Whereas by using RME approach, it is student-centered, so they can be active, have passionate in learning and be able to solve problems with the process of constructing ideas and expand their imagination. This data

support Wirama's opinion (Wirama, 2014) that there are significant different results of mathematics learning between students who were following RME approach and others students that following the conventional learning approach.

Based on this research, the Realistic Mathematics Education (RME) approach is student-centered, so students become active, have passionate about learning. This all have correspondence with Ayu's thinking (Ayu, 2013) that the Realistic Mathematics Education (RME) approach can encouraging enthusiasm, passion, and confidence of students in the learning process. By applying the Reaistic Mathematics Education (RME) approach, students become more interested in mathematics which are proven by the improvement of mathematics learning results, this are have correspondence with the research by Mashudi (Mashudi, 2016) shows that the RME approach has changed the students attitude to be more interested in mathematics and make the learning activities of students become better than before. Likewise with invention by Prayoga Pangestu (Prayoga Pangestu, 2016) that the RME approach can influences pleasure of students' learning. The uses of RME approach are suitable to be applied in the learning process of mathematics subjects, because students become more interested about mathematics. However, with Zerri's invention (Zerri, 2017) shows that in teaching and learning process with "Jarimatika" method can be more memorable and more interesting, so it can generate and encourage the interest of students' learning.

By applying the Realistic Mathematics Education (RME) approach, it is student-centered learning, so teachers be a facilitator only, this invention is in accordance with Wirama's opinion (Wirama, 2014) shows that by applying RME approach, teachers roles as adviser rather than be informer, so in the learning process the domination of teachers can be reduced. These data are supported by Subryanto's opinion (Subryanto, 2014) shows that in every learning activities, the teachers guides and assists students in completing the given tasks, so the task from teachers can be completed properly and correctly.

In this research, the props/media of "Sate Bilangan" are a real objects, so it is a concrete objects to help the learning process of students, through the media of "Sate Bilangan", students can experience themselves and use it directly, so it easier to students to search for some possible solutions using mathematical abilities that they already have. Not only "Sate Bilangan", based on invention of Indhira (Indhira, 2017) shows that the media of Monopoly is a real objects, concrete objects to help the learning process of students. It is an evident prove that the media of Monopoly can improve students' ability to more understood the concepts. Based on the opinion of Pita Ajeng (Robiyanto, 2016) shows that learning mathematics are requires the right media such as the right props or concrete objects that can be manipulated by students to understand the concepts. As Valiant (2016) stated, the use of learning media becomes the supporting tools that can increase the efficiency and effectiveness of the learning successes.

Learn with Realistic Mathematics Education (RME) approach can facilitate students to gain knowledge, so it will be easy to remember and last much longer because the RME approach are directly related to the real world, besides of that the students can solve the problems in their own way, this is supported by Ariyanti's invention (Ariyanti, 2009) shows that the students can construct their own knowledge, therefore students do not easily forget the materials that they acquired from the learning process through the Realistic Mathematics Education (RME) approach. The Realistic Mathematics Education (RME) approach allows students to develop ideas, as well as the process of constructing mathematical knowledge by students themselves, this data confirms Soviawati's opinion (Soviawati, 2011) that the Realistic Mathematics Education (RME) approach can increase thinking skills of students at the elementary school.

D. Conclusion

Based on the results of this research and discussion about the application of Realistic Mathematics Education (RME) approach to increased the students' learning outcomes of 2nd grades students in mathematics subjects about multiplication concepts from Elementary School SD Negeri Salatiga 12, then has been found some conclusions, and that is:

1. The application of Realistic Mathematics Education (RME) approach can increased the mathematics learning outcomes of 2nd grade students from SD Negeri Salatiga 12 about the material of multiplication concepts.
2. The Realistic Mathematics Education (RME) approach is centered on students, so they can be active, have passionate in learning and be able to solve problems with the process of constructing ideas and expand their imagination.
3. By applying the Realistic Mathematics Education (RME) approach, students can become more interested about mathematics, which can be proved by the good improvement on the learning outcomes.
4. The application of Realistic Mathematics Education (RME) approach, the teachers only acts as a facilitator and mentor, so in the learning process the domination of teachers can be reduced because this approach is student-centered.
5. Learn with Realistic Mathematics Education (RME) approach can facilitate students to gain knowledge, so it will be easy to remember and last much longer because the RME approach are directly related to the real world, besides of that the students can solve the problems in their own way.
6. The Realistic Mathematics Education (RME) approach allows students to develop ideas, as well as the process of constructing mathematical knowledge by students themselves.

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